Claims

1. A photonic circuit comprising:

a resonator;

means for heating said resonator;

means for measuring a temperature of said resonator; and

means for coupling said temperature measuring means to said heating means;

wherein said temperature measuring means monitors said temperature of said resonator and transmits signals to said heating means based on said temperature; and further

wherein said heating means is enabled or disabled so that said resonator is maintained at a precise temperature and selectively filters a frequency of light corresponding to said temperature.

2. The photonic circuit according to claim 1, wherein said resonator, said heating means, said temperature measuring means, and said coupling means are etched onto an integrated circuit chip.

3. The photonic circuit according to claim 1, wherein said temperature of said resonator is varied over a range of temperatures, thereby causing said resonator to

selectively add and drop frequencies corresponding to said temperatures, and wherein said photonic circuit further comprises means to process said selected frequencies.

4. The photonic circuit according to claim 1, wherein said circuit is used as an accurate control for photonic switching.

5. The photonic circuit according to claim 1, wherein said temperature measuring means comprise an aluminum wire.

6. The photonic circuit according to claim 1, wherein said coupling means comprise a processor.

7. A process to variably tune a frequency selected by a photonic resonator comprising the steps of:

identifying a frequency to be selected by said photonic resonator;

sensing a temperature of said photonic resonator;

transmitting a measure of said temperature to a processor;

determining whether said temperature of said photonic resonator corresponds to said selected frequency; and

adjusting said temperature of said photonic resonator to correspond with said selected frequency.

8. The process to variably tune a frequency selected by a photonic resonator according to claim 7, wherein said temperature is sensed by a change in resistance of a metal wire.

9. The process to variably tune a frequency selected by a photonic resonator according to claim 8, wherein said metal wire comprises aluminum.

10. The process to variably tune a frequency selected by a photonic resonator according to claim 9, further comprising the steps of:

measuring a resistance of said wire at room temperature;

increasing resonator temperature by forcing a current though the said wire;

determining the temperature of said photonic resonator during operation by measuring the resistance of the wire at this temperature.

11. The process to variably tune a frequency selected by a photonic resonator according to claim 8, further comprising the steps of:

transmitting a current through said wire;

connecting a volt meter to said wire;

measuring a voltage across said wire; and

calculating the resistance of said wire.

12. The process to variably tune a frequency selected by a photonic circuit according to claim 11, wherein said volt meter is connected to said wire via a Kelvin connection.

13. The process to variably tune a frequency selected by a photonic resonator according to claim 7, wherein said measure of temperature is used as a key into a lookup table, said lookup table comprising different frequencies selected by said resonator at different temperatures.

14. A process to manufacture an integrated photonic resonator circuit, said circuit comprising means to variably tune said resonator to a selectable frequency, comprising the steps of:

etching onto a substrate a photonic resonator;

patterning a sensor element onto said circuit;

placing a first passivation layer over said sensor element;

patterning a heating element onto said circuit;

placing a second passivation layer over said heating element;

placing down a conductor layer, patterning said conductor layer, and etching said conductor layer;

placing a third passivation layer over said conductor layer; and

patterning and etching said circuit, said patterning and etching opening up holes through said passivation layer to expose said heating and sensor elements, and connecting said heating and sensor elements to drive circuitry in said circuit.

15. The process to manufacture an integrated photonic resonator circuit according to claim 14, wherein said sensor element is patterned onto a first plane of said circuit, and said heating element is patterned onto a second plane of said circuit.

16. The process to manufacture an integrated photonic resonator circuit according to claim 14, wherein said sensor element is necked down to micron or submicron levels.

17. The process to manufacture an integrated photonic resonator circuit according to claim 14, wherein said sensor element and said heater element are positioned equidistantly from said resonator.

18. The process to manufacture an integrated photonic resonator circuit according to claim 14, wherein said passivations are planarized with reflow, etch, or chemical/mechanical processing techniques.

19. The process to manufacture an integrated photonic resonator circuit according to claim 14, wherein said conductor is 5,000A sputtered aluminum with 0.5% copper.

20. The process to manufacture an integrated photonic resonator circuit according to claim 14, wherein said third passivation layer comprises 3 microns of plasma enhanced chemical vapor disposition oxide.

21. The process to manufacture an integrated photonic resonator circuit according to claim 14, wherein said heater element is positioned over or under said resonator, and said sensor element is positioned over said heater.

22. The process to manufacture an integrated photonic resonator circuit according to claim 21, wherein said heater element and said sensor element are put down and patterned in separate steps.

23. The process to manufacture an integrated photonic resonator circuit according to claim 22, wherein said heater element and said sensor element are manufactured from different materials.